AGILENT TECHNOLOGIES, INC.
Legal Department, DL429
Intellectual Property Administration
P. O. Box 7599
Loveland, Colorado 80537-0599

APJ 1600

PATENT APPLICATION

ATTORNEY DOCKET NO. 10990616-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Christopher A. Schantz et al.

Serial No.: 09/558,532 **Examiner:** Betty J. Forman

Filing Date: 04/26/2000 **Group Art Unit:** 1634

Title: ARRAY FABRICATION WITH DROP DETECTION

ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith in triplicate is the Appeal Brief in this application with respect to the Notice of Appeal filed on **09/23/2002**.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) $320.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

(X) (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

(X)	one month	$110.00
( )	two months	$410.00
( )	three months	$930.00
( )	four months	$1450.00

( ) The extension fee has already been filled in this application.

( ) (b) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 50-1078 the sum of **$430.00**. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account 50-1078 pursuant to 37 CFR 1.25.

(X) A duplicate copy of this transmittal letter is enclosed.

(X) I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231.
Date of Deposit: 12/23/02 or

~~I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.~~
( ) Date of Facsimile:

Typed Name: **Gordon M. Stewart**

Signature: _____

Respectfully submitted,

Christopher A. Schantz et al.

By _____

Gordon M. Stewart
Attorney/Agent for Applicant(s)
Reg. No. **30,528**

Date: 12/23/02

Telephone No.: **(650) 485-2386**

Agilent Docket No. 10990616-1

#14
CD

In the United States Patent and Trademark Office
Board of Patent Appeals and Interferences

In re Application of

Inventor: Chrisopher J. Schantz et al.

Title: ARRAY FABRICATION WITH DROP DETECTION

Serial No.: 09/558,532

Filed: April 26, 2000

Group Art Unit: 1634

Examiner: Betty J. Forman

I hereby certify that this correspondence is being deposited today with the United States Postal Service as first class mail in an envelope addressed to Assistant Commissioner for Patents, Washington, D.C. 20231.

12/23/02
Date

Hon. Assistant Commissioner for Patents
BOX: BOARD OF PATENT APPEALS AND INTERFERENCES
Washington, D.C. 20231

Sir:

APPEAL BRIEF

A Notice of Appeal was facsimile transmitted on Sept. 23, 2002. A request for a 1-month extension to file the present Appeal Brief is enclosed.

Respectfully submitted,

Gordon M. Stewart
Attorney for Applicant
Reg. No. 30,528

Gordon M. Stewart:
Agilent Technologies, Inc.
Telephone: (650)485-2386
Facsimile: (650)485-5487

~~12/31/2002 NMOHAMM1 00000117 501078 09558532~~

~~01 FC:1401 320.00 CH~~

Void date: 12/31/2002 NMOHAMM1
12/31/2002 NMOHAMM1 00000117 501078 09558532
01 FC:1401 320.00 CR

12/31/2002 NMOHAMM1 00000117 501078 09558532

02 FC:1251 110.00 CH

12/31/2002 NMOHAMM1 00000118 501078 09558532

01 FC:1402 320.00 CH

TABLE OF CONTENTS

APPEAL BRIEF

I. Real Party in Interest

The real party in interest is Agilent Technologies, Inc., assignee of the present application and invention.

II. Related Appeals and Interferences

There are no other related appeals or interferences.

III. Status of Claims

Claims 4-7, 9-11, 13-17, 21, 28-32, 38, 43, 44. are pending and stand rejected. The only independent claims are as follows (claims directly or indirectly dependent on each are indicated in parentheses after each): The following claims remain in the present case: **4** (5, 6, 9), 7, **10** (11), **13** (14), **15** (16), **17**, **21**, **28** (29, 30), **31** (32), **38**, **43**, **44**.

IV. Status of Amendments

The last amendments made to the present application were Response and Amendment mailed Sept. 23, 2002. In the Advisory Action mailed Sept. 25, 2002 the Examiner stated that the proposed amendments in that paper would be entered for the purposes of Appeal. Accordingly, all the pending claims (including the foregoing after final amendments) are reproduced in the attached APPENDIX.

V. Summary of the Invention

The present invention provides method and apparatus for fabricating biopolymer arrays. Biopolymer arrays are useful for diagnostic, screening, gene expression analysis, and other applications (page 1, lines 6-8). Such arrays 12 may contain hundreds or thousands of different features 16 (FIGS. 1-3; page 10, lines 26-28) which may range in size from 10 micrometers to 1 cm, but are more usually about 10 to 200 micrometers in diameter (page 13, lines 23-28). These features should be accurately positioned and sized on a substrate on which they are formed. The results obtained from a given array in diagnostic or other applications can be seriously mis-interpreted if this is not the case and the array user has not aware of any deviations (page 3, lines 4-12). The present invention then provides a means for fabricating arrays using a drop dispenser, such as a head 210 with piezo or thermal pulse jets as might be used in ink jet type of printer (page 12, lines 20-27; FIG. 4) to dispense biopolymers or their precursors onto a substrate 10. In a typical fashion the head 210 is scanned line by line across the substrate 10 while drops containing previously obtained biopolymer or biopolymer precursors are dispensed from head 210 using known chemistry. Head 210 may be reloaded one or more times during this process (page 16, lines 22 to 33).

To avoid errors in fabricated features or alternatively to identify error features in arrays as they are fabricated, the present invention uses an electric sensing element 214 of various configurations (FIGS. 4, 6A-6C, 7; page 14 line 22 to page 15, line 21). In one configuration the substrate 10 on which an array is to be fabricated, can itself act as the sensing element (page 15, lines 11-15).

The sensing element may be used to detect drops (and hence various dispenser unit characteristics) as head 210 passes beyond the substrate 10 (page 18, lines 8-12). For example, pulse jet priming may be checked or dispensing may be checked after re-loading but before dispensing any droplets for an array (page 18, lines 14-18). Any characteristic can be checked following one or more (or all) of the repeated scans of head 210 across substrate 10 (page 18, lines 18-21).

Various uses can be made of the evaluated performance characteristics of head 210. These include halting the process, when a de-priming condition is detected then firing the de-primed pulse jet until it is primed, or operating the deposition apparatus in a

manner which corrects for the detected error (page 19, line 10 to page 20, line 7). Other uses include correlating the error with the defective features 16 of an array 12 and saving that information into a memory 141 or portable storage medium 324b in association with a unique identifier 356 for that array (page 20, lines 8-24; FIG. 1 and FIG. 4). This saved error information can later be retrieved by a remote array user using the array identifier 356 (FIG. 5; page 21, lines 13-23), and used in the reading or interpretation of results from the array.

VI. Issues

The rejections outstanding are summarized in the final Office Action mailed May 22, 2002 as follows:

A. Are claims 4, 5, 7, 9-11, 13, 14, 17, 28, 29, 31, 32, 43, 44 unpatentable under 35 U.S.C. 103(a) over Schantz et al. (U.S. Patent No. 6,086,190) in view of Brennan (U.S. Patent No. 5,474,796)?

B. Are claims 6, 15, 16, 30 unpatentable under 35 U.S.C. 103(a) over Schantz et al. (U.S. Patent No. 6,086,190) and Brennan (U.S. Patent No. 5,474,796), and further in view of Brown et al. (U.S. Patent 5,807,522)?

C. Is claim 21 unpatentable under 35 U.S.C. 103(a) over Schantz et al. (U.S. Patent No. 6,086,190) in view of Brennan (U.S. Patent No. 5,474,796), and further in view of Fleischer et al. (U.S. Patent No. 4,067,019)?

D. Is claim 38 unpatentable under 35 U.S.C. 103(a) over Schantz et al. (U.S. Patent No. 6,086,190) in view of Brennan (U.S. Patent No. 5,474,796), and further in view of Fleischer et al. (U.S. Patent No. 4,067,019)?

VII. Grouping of Claims

For the reasons discussed in Section VIII below, the claims are grouped as listed below. Claims within each group for a rejection are considered to stand or fall together for the purposes of that rejection except where some claims within a group are further classified into a sub-group (denoted by "A" or "B" after the roman numeral), and additional reasons for reversal are provided in connection with those sub-groups.

Issue A: - Group I - Claims 4, 5, 9, 28, 29, 43
Group IA - Claims 5, 29
Group IB- Claim 9
Group II - Claim 7
Group III - Claims 10, 11, 31, 32, 44

Group IIIA - Claims 11, 32
Group IV - Claims 13, 14
Group V - Claim 17

Issue B: Group VI - Claim 6, 30
Group VII - Claims 15, 16
Group VIIA - Claim 16

Issue C: Claim 21 only

Issue D: Claim 28 only

VIII. Argument

Issue A. – Rejection of claims 4, 5, 7, 9-11, 13, 14, 17, 28, 29, 31, 32, 43, 44 under 35 U.S.C. 103(a) over Schantz et al. (U.S. Patent No. 6,086,190) in view of Brennan (U.S. Patent No. 5,474,796)

First, with regard to this (and other) rejections, the Examiner bears the initial burden of establishing a *prima facie* of rejection. This has been made clear by the Federal Circuit in , for example, *In re Oetiker* 24 USPQ2d 1443 @ 1444 (Fed. Cir.; 1992):

> "As discussed in *In re Piasecki* , the examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a prima facie case of unpatentability. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant."

Further, in order for the Examiner to establish a *prima facie* case of obviousness, the prior art must provide the requisite suggestion or motivation, not the Examiner based on a hindsight reconstruction using the Applicants' specification. This has been clearly stated by the Federal Circuit in, for example, In re Vaeck 20 USPQ2d 1438 (1991) @ 1442:

> "Where subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under s. 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. See *In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure. *Id.*"

In the "Response to Arguments" section of the Final Rejection (pages 19-20) the Examiner states that Applicants are attacking the references individually and that this does not show nonobviousness. However, as can be seen from the above if the prior art does not provide a suggestion for the invention as claimed (including all claimed elements), there is no *prima facie* case of obviousness. In attempting to meet her burden the Examiner in the Final Rejection relied upon specific portions of one or the other references for a suggestion of elements in the rejected claims. The Examiner cannot logically complain when Applicants attempt to show that the Examiner's reliance on those portions for the required suggestion is misplaced.

The rejections of the claim groups under this heading will now be discussed bearing these principles in mind.

Group I - Claims 4, 5, 9, 28, 29, 43

Claim 4 requires during biopolymer array fabrication:

> "when after the dispensing of some droplets onto the substrate an error is detected in which an evaluated performance characteristic is outside a predetermined tolerance, then the source of the error is corrected prior to dispensing of other of the droplets onto that same substrate or the deposition apparatus is operated so as to compensate for the error during dispensing of other of the droplets onto that same substrate."

The above language requires during biopolymer array fabrication, detecting an error after dispensing some droplets onto a substrate, then dispensing further droplets onto the same

substrate after error detection with the error being corrected or with compensation for the error. The Examiner has not satisfied her burden to establish a *prima facie* case of obviousness by pointing to a suggestion or motivation for this feature in the cited references. In particular, the Examiner points to column 6, line 38 to column 7, line 17 of Schantz et al. for the above feature. However, the foregoing cited portions of Schantz et al. merely refer to adjusting Schantz et al.'s printing algorithm to compensate for bad nozzles, providing an error indication to a user, characterizing nozzles to enhance gray scale or color resolution, or adjusting drive voltages to nozzles. Nothing in the foregoing requires or suggests detecting an error after dispensing some droplets onto a substrate, then dispensing further droplets onto the same substrate after error detection with the error being corrected or with compensation for the error during such dispensing onto the same substrate. In fact in the cited portions of Schantz et al. the only thing that is stated about when Schantz et al.'s measurements should be made is in column 6, lines 18-22:

> "The drop detection values is useful for rendering a go/no-go decision on each of the nozzles in the print head 10. For example in one embodiment, the printer processor 20 opportunistically tests a few nozzles on the fly at the end of a print cycle on a page." (emphasis added)

Thus, the only suggestion that the Examiner has pointed to in Schantz et al. or elsewhere regarding when to test, is for testing at the end of a page. Therefore, even if one were to combine Brennan with Schantz et al. in the manner suggested by the Examiner the claimed invention is still not obtained nor suggested (which includes during biopolymer array fabrication, detecting an error after dispensing some droplets onto a substrate, then dispensing further droplets onto the same substrate after error detection with the error being corrected or with compensation for the error). For this reason alone (failure to establish a *prima facie* case of obviousness based on the references) this rejection should be withdrawn.

In addition, if anything Schantz et al. teaches away from the claimed feature of detecting an error after dispensing some droplets onto a substrate during biopolymer array fabrication, then dispensing further droplets onto the same substrate after error detection with the error being corrected or with compensation for the error. In

particular, when Schantz et al. tests a printhead this requires moving the head off the paper to the drop sensing element 14. One might speculate that perhaps Schantz et al.'s apparatus might be provided with appropriate electronic/mechanical components to move the head back onto a correct position on a same substrate so that printing could accurately be continued with error correction or error compensation on that same substrate. However, this would require appropriate electronic/mechanical controls whereas Schantz et al. is completely concerned about maintaining the cost of the printer low (see, for example, column 2, lines 21-23). To maintain costs of the printer low, rather than somehow providing for accurate repositioning of the head to continue printing in the correct position on a same substrate after error correction or with error compensation, one is motivated to simply throw a printed page away if there was a problem (printed pages being very cheap).

Accordingly, since Schantz et al. actually teaches away from the presently claimed invention, the present rejection should be reversed for this additional reason.

Claim 43 contains an analogous limitation as discussed above in connection with claim 4 and the rejection of claim 43 should be allowed for the same reasons as discussed above. In rejecting claim 43 on page 13 of the Action, the Examiner references column 6, lines 23-49 and Fig. 1 of Schantz et al. However, again none of the foregoing lines disclose or suggest detecting an error after dispensing some droplets onto a substrate, then dispensing further droplets onto the same substrate after error detection with the error being corrected or with compensation for the error. Nor does the Examiner even allege they do. Thus, this rejection of claim 43 should also be reversed for the same reasons discussed above.

Group IA - Additional Arguments with Respect to Claims 5, 29

Claim 5 requires in the fabrication of a biopolymer array:

> "prior to dispensing of other of the droplets for the same biopolymer array or the deposition apparatus is operated so as to compensate for the error during dispensing of other of the droplets for the same array" (emphasis added)

Claim 29 requires an analogous limitation. Thus, the testing is done after fabrication of an array has commenced but before dispensing further droplets in the fabrication of that **same array**. Even if, contrary to what was discussed above, the Examiner has pointed to something in the references which provides a suggestion or motivation for testing during dispensing of droplets onto a same substrate, she has not pointed to anything which discloses or suggests during biopolymer array fabrication, detecting an error after dispensing some droplets onto the array, then dispensing further droplets **onto the same array** after error detection with the error being corrected or with compensation for the error. Thus, even if one combines Brennan with Schantz et al. in the manner suggested by the Examiner, the claimed invention is still not obtained nor has the Examiner pointed to anything in the references which suggests the above claimed feature in the resulting combination.

Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness and this rejection should be reversed for this reason alone.

In addition, as discussed above when Schantz et al. tests a printhead this requires moving the head off the paper to the drop sensing element 14. One might speculate that perhaps Schantz et al.'s apparatus might be provided with appropriate electronic/mechanical components to move the head back onto a correct position on a same array so that printing could accurately be continued with error correction or error compensation on that same array. However, this would require appropriate electronic/mechanical controls whereas Schantz et al. is completely concerned about maintaining the cost of the printer low (see, for example, column 2, lines 21-23). To maintain costs of the printer low, rather than somehow providing for accurate repositioning of the head to continue printing in the correct position on a same array after error correction or with error compensation, one is motivated to simply throw a printed page away if there was a problem (printed pages being very cheap).

For the foregoing additional reason (that Schantz et al. actually teaches away from the claimed method) this rejection of claims 5, 29 should be reversed.

Group IB - Additional Arguments with Respect to Claim 9

Claim 9 additionally recites that during biopolymer array fabrication:

> "the dispenser unit comprises a pulse jet which ejects a droplet in response to a signal and which can de-prime, and the error is corrected by re-priming the pulse jet".

Note that it is the pulse jet which can de-prime and which is re-primed. The Examiner points to column 7, lines 1-17 of Schantz et al. and states that this discloses "adjusts the voltage which primes the pulse". First, the foregoing lines merely refer to selecting an "optimum drive condition" (voltage; see line 13). There is no reference to "priming" anything. Second, even if in some abstract fashion there is some teaching of "priming a pulse" as the Examiner suggests (which is specifically disputed), this is not a teaching or suggestion for "re-priming the pulse jet" to correct a de-primed jet, as required by claim 9.

In the Response to Arguments section of the Final Rejection the Examiner states that "priming" and "de-priming" encompass voltage application and adjustment to prepare the printer for printing. However, applying a voltage is not "priming" a pulse jet within the meaning of the claim. In particular, the Merriam-Webster on-line dictionary (www.merriam.com) provides the following definition for "priming":

> "1 : FILL, LOAD
> 2 a : to prepare for firing by supplying with priming b : to insert a primer into (a cartridge case)
> 3 : to apply the first color, coating, or preparation to <prime a wall>
> 4 : to put into working order by filling or charging with something <prime a pump with water>
> 5 : to instruct beforehand : COACH <primed the witness>
> 6 : STIMULATE
> intransitive senses : to become prime

> - prime the pump : to take steps to encourage the growth or functioning of something "

Furthermore, the above main definition of priming (filling or loading) the pulse jet is completely consistent with the present application where, for example, page 17, lines 7-12, and page 19, lines 14-17 and 21-24, refer to priming until a drop is ejected in response to a signal. Voltage application or adjustment to a pulse jet, contrary to what is alleged by the Examiner, cannot reasonably be considered a "filling" or "loading" of the pulse jet.

Therefore, the Examiner has not in fact pointed to anything in the cited references which might disclose or suggest during biopolymer array fabrication, a pulse jet which can de-prime, and for which the error is corrected by re-priming the pulse jet. Even if one combines Brennan with Schantz et al. in the manner suggested by the Examiner then, the claimed invention is still not obtained nor has the Examiner pointed to anything in the references which would suggest the above claimed feature in the resulting combination. Accordingly, the Examiner has not established a *prima facie* case of obviousness and this rejection of claim 9 should be withdrawn for this additional reason.

Group II - Claim 7

Claim 7 additionally recites during biopolymer array fabrication:

> "comprising changing biopolymers or biopolymer precursors in the dispenser unit to different biopolymers or biopolymer precursors, wherein the detection [of electrical signals resulting from dispensed droplets striking the sensing element] and evaluation are performed after the changing and before a dispensing of any droplets for an array."

The Examiner states that it would have been obvious to apply the different reagent sets of Brennan to the detection and evaluation of Schantz et al.. Even assuming this to be true, the Examiner has not pointed to anything in the cited references which motivates one to specifically perform the detection and evaluation after the changing of fluids in the dispenser unit, and before dispensing of the droplets. Therefore, even if one combines

Brennan with Schantz et al. in the manner suggested by the Examiner, the claimed invention is still not obtained nor has the Examiner pointed to anything in the references which would suggest the above claimed feature in the resulting combination.

Thus, the Examiner has not satisfied her burden of establishing a *prima facie* case of obviousness and the rejection of claim 7 should be reversed for this additional reason.

Group III - Claims 10, 11, 31, 32, 44

Claims 10, 11 further requires in the fabrication of a biopolymer array:

> "when an error is detected in which an evaluated performance characteristic is outside a predetermined tolerance, identifying one or more features on the array which are defective as a result of the error".

The Examiner states that it would have been obvious from Schantz et al. to "reject the array having droplets dispensed by the rejected dispenser unit for the obvious benefit of quality control". However, even assuming the correctness of this statement this still does not meet the invention as claimed, which requires identifying those features on the array which are defective as a result of the error.

Claim 31, 32 and 44 contain an analogous limitation to that of claim 10 (claims 31, 32 - "identifies one or more features on the array which are defective as a result of the error"; claim 44 "identifying one or more features on the array which are defective as a result of the error"). It is noted that in discussing claim 31 on page 7 of the Final Rejection the Examiner states that Schantz et al. "correlates the error with one or more features on the array i.e. the program correlates droplet detection values and faulty nozzles (Column 6, lines 23-64)". However, while the foregoing lines of Schantz et al. do indeed teach correlating droplet detection values with faulty nozzles, this is not the same as identifying one or more features on a biopolymer array which are defective as a result of the error, as required by the presently rejected claims (since during printing a nozzle

would print many different spots, amongst all the other spots printed by other nozzles). The Examiner does not point to anything in the references which discloses or suggests identifying the defective features. With regard to claim 44 discussed on pages 10-11 of the Final Action, it is noted that the Examiner does not even allege such a feature is disclosed or suggested by the cited references.

Therefore, even if one combines Brennan with Schantz et al. in the manner suggested by the Examiner, the claimed invention is still not obtained nor has the Examiner pointed to anything in the references which would suggest the above claimed feature in the resulting combination. As a result, the Examiner has failed to establish even a *prima facie* case of obviousness of these claims and this rejection should therefore be reversed.

Group IIIA - Claims 11, 32

These claims further require in the fabrication of a biopolymer array:

> "communicating an identity of the identified defective features to a remote location or saving such information onto a storage medium".

The Examiner states that Schantz et al. "teach the method additionally comprising saving information relating to the defective features onto a storage medium i.e. printer processor (Column 6, lines 7-27)". However, in the foregoing lines the only data that is stored is a "drop detection value verses the number of ink drops contained in each of the bursts 30-32", which is used to determine the number of drops deposited (column 6, lines 23-27). There is nothing in the foregoing lines which discloses or suggests then communicating an identity of the identified defective features or saving such information onto a storage means, as recited in these claims. Thus, even if one were to combine Brennan with Schantz et al. as suggested by the Examiner, the claimed invention is still not obtained nor has the Examiner pointed to any suggestion in the references for making the claimed

invention with the feature of "communicating an identity of the identified defective features to a remote location or saving such information onto a storage medium".

Accordingly, for this additional reason, the rejection of this claim should be reversed.

Group IV - Claims 13, 14

Claim 13 additionally requires during biopolymer array fabrication:

> "the dispenser unit comprises one or more pulse jets which eject a droplet in response to a signal which require priming; and
> the evaluated performance characteristic is whether one or more of the pulse jets are primed prior to dispensing any droplets for an array"

The Examiner states that Schantz et al. "teach the method wherein the dispenser unit comprises pulse jets which eject a droplet in response to a priming signal (Column 3, lines 13-21) and the evaluated performance characteristic is whether one or more pulse jets are primed (Column 6, lines 23-27)". The referenced lines in column 3 refer to the drive voltage for actuating firing of the nozzles. This does not indicate that the disclosed pulse jets "require priming" as recited in claim 13. Even assuming such a feature is disclosed though, column 6, lines 23-27 disclose only using the previously stored relationship of drop detection value versus number of ink drops contained in each burst to determine the number of drops deposited and neither disclose nor suggest anything about the evaluated performance characteristic being whether the pulse jets are primed prior to dispensing any droplets for the array, as required by claim 13. Furthermore, note that simple voltage application and adjustment to the dispensers cannot be regarded as "priming" a pulse jet since such requires "filling" or "loading" the pulse jet, as discussed above in connection with Group IB (claim 9).

Thus, the Examiner has not pointed to anything in the cited references which disclose or suggest pulse jets which require priming, nor the evaluated performance characteristic being whether the pulse jets are primed. Even if one combines Brennan with

Schantz et al. in the manner suggested by the Examiner then, the claimed invention is still not obtained nor has the Examiner pointed to anything in the references which would suggest the above claimed feature in the resulting combination. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness of the claimed invention, and this rejection should therefore be reversed.

Group V - Claim 17

Claim 17 additionally recites during biopolymer array fabrication, that:

"the sensor comprises the substrate".

Note that as described earlier in the claim, the substrate is the element on which the biopolymer array is formed. The Examiner states that Schantz et al. teaches the sensor comprises the substrate i.e. the surface upon which the droplets are dispensed, and references column 7, lines 26-30. However, the foregoing lines refer to the sensor being an electrically conductive layer "contained in a trough or spittoon that accepts test ink drops". Nothing in these lines suggests using the substrate on which an array is formed, as a sensor. Therefore, even assuming that it is obvious to combine Brennan with Schantz et al. as suggested by the Examiner, the sensor in the resulting apparatus is still not the substrate on which an array is formed but is in fact totally separate from that substrate as taught by Schantz et al. Thus, even assuming the correctness of the Examiner's suggested combination, the invention of the present claim is still not obtained.

Therefore, the Examiner has failed to point to any suggestion or motivation from the references to provide in a combination of Brennan with Schantz et al., a sensor which comprises the substrate. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness of this claim, and this rejection should therefore be reversed.

Issue B - Rejection of claims 6, 15, 16, 30 as unpatentable under 35 U.S.C. 103(a) over Schantz et al. (U.S. Patent No. 6,086,190) and Brennan (U.S. Patent No. 5,474,796), and further in view of Brown et al. (U.S. Patent 5,807,522)

Group VI - Claim 6, 30

Claim 6 requires during biopolymer array fabrication:

> "wherein the error is detected after the dispensing of droplets for at least one of the arrays on the same substrate, and the source of the error is corrected prior to dispensing of droplets for other of the arrays on the same substrate or the deposition apparatus is operated so as to compensate for the error during dispensing of droplets for the same array or other of the arrays on the same substrate" (emphasis added)

Claim 30 has a somewhat similar limitation but relating only to "other of the arrays on the same substrate".

Even assuming that it would have been obvious to combine Schantz et al. and Brennan, with Brown (disclosing multiple arrays on a substrate) as the Examiner suggests, the Examiner has not pointed to anything in the cited references which discloses or suggests the above specific feature in the resulting combination. Further, the Examiner does not even allege that the cited references disclose or suggest that "the source of the error is corrected prior to dispensing of droplets for other of the arrays on the same substrate" or that "the deposition apparatus is operated so as to compensate for the error during dispensing of droplets for the same array or other of the arrays on the same substrate".

Accordingly, the rejection of claims 6, 30 should be reversed.

Group VII - Claims 15, 16

Claim 15 requires during fabrication of a biopolymer array:

> "the sensing element is struck by droplets so as to generate electrical signals when the dispenser unit passes beyond the array being fabricated on multiple scans during fabrication of the array"

The Examiner does point to a suggestion in the references to provide a scanning dispensers. However, she does not point to anything disclosing or suggesting that the sensing element is struck by droplets so as to generate electrical signals when the dispenser unit passes beyond the array being fabricated on multiple scans during fabrication of the array.

Accordingly, this rejection should be reversed as the Examiner has not established a *prima facie* case of obviousness.

Group VIIA - Claim 16

Claims 16 require during fabrication of a biopolymer array:

> "the sensing element is struck by droplets so as to generate electrical signals when the dispenser unit passes beyond the array being fabricated on multiple scans during fabrication of the array. "

The Examiner does point to Schantz et al. as teaching the sensing element being struck by droplets to produce electrical signals. However, the Examiner does not point to anything which is alleged to teach or suggest that the sensing element is struck by droplets so as to generate electrical signals when the dispenser unit passes beyond the array being fabricated on multiple scans during fabrication of the array.

Accordingly, for this additional reason the rejection of claim 16 should be reversed.

Issue C - Rejection of claim 21 as unpatentable under 35 U.S.C. 103(a) over Schantz et al. (U.S. Patent No. 6,086,190) in view of Brennan (U.S. Patent No. 5,474,796), and further in view of Fleischer et al. (U.S. Patent No. 4,067,019)

This claim further requires in the fabrication of biopolymer arrays:

> "dispensing multiple droplets from the dispenser unit at each of at least two different distances from the sensor, and wherein droplet velocity is evaluated based on the phase difference between the detected signal from multiple droplets at each distance"

Even assuming the references provide a suggestion to combine them in the manner proposed by the Examiner (which is disputed in Part I), the invention of this claim is still not obtained. In particular, the Fleischer relates to detecting a drop position in an ink jet printing system (see, for example, column 2, lines 34-36). The Examiner makes the allegation that it would have been obvious because of this to dispense droplets at different distances from the sensor. However, even if this is true the Examiner does even attempt to point to any disclosure or suggestion in the references where "droplet velocity is evaluated based on the phase difference between the detected signal from multiple droplets at each distance" as required by claim 21. Given the foregoing, the Examiner has not established a *prima facie* case of obviousness for claim 21 and this rejection should therefore be reversed.

Issue D - Rejection of claim 38 as unpatentable under 35 U.S.C. 103(a) over Schantz et al. (U.S. Patent No. 6,086,190) in view of Brennan (U.S. Patent No. 5,474,796), and further in view of Fleischer et al. (U.S. Patent No. 4,067,019)

This claim additionally requires that the processor in the fabrication of a biopolymer array:

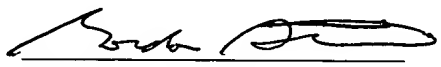
> causes the dispenser unit to dispense multiple droplets at each of at least two different distances from the sensor, and wherein droplet velocity is evaluated based on the phase difference between the detected signal from multiple droplets at each distance"

The Examiner again relies upon Fleischer et al. for a suggestion for the foregoing element. However, as discussed above under "Issue C" the Examiner has failed to satisfy her burden of establishing a *prima facie* case of obviousness by pointing to any disclosure or suggestion in the references that "droplet velocity is evaluated based on the phase difference between the detected signal from multiple droplets at each distance".

Accordingly, this rejection of claim 38 should be reversed.

Accordingly, for the reasons discussed above, all of the rejections of claims 4-7, 9-11, 13-17, 21, 28-32, 38, 43, 44. should be reversed.

Respectfully submitted,



Gordon M. Stewart
Attorney for Appellant
Registration No. 30,528

Telephone: (650)236-2386
Facsimile: (650)852-8063

APPENDIX – Claims

4. A method A method of fabricating at least one addressable array of biopolymers with multiple features on a substrate using a drop deposition apparatus having a drop dispenser unit and a sensing element, comprising:

(a) for each of multiple addresses, dispensing droplets carrying the biopolymers or biopolymer precursors from a drop dispenser unit onto the sensing element, and onto the substrate so as to fabricate the array;

(b) detecting electrical signals resulting from dispensed droplets striking the sensing element;

(c) evaluating a performance characteristic of the deposition apparatus based on the detected signals

wherein the sensing element optionally comprises the substrate;

additionally comprising:

when after the dispensing of some droplets onto the substrate an error is detected in which an evaluated performance characteristic is outside a predetermined tolerance, then the source of the error is corrected prior to dispensing of other of the droplets onto that same substrate or the deposition apparatus is operated so as to compensate for the error during dispensing of other of the droplets onto that same substrate.

5. A method according to claim 4 wherein the error is detected after the dispensing of some of the droplets for an array, and the source of the error is corrected prior to dispensing of other of the droplets for the same array or the deposition apparatus is operated so as to compensate for the error during dispensing of other of the droplets for the same array.

6. A method according to claim 4 wherein:

multiple arrays are fabricated on the same substrate; and

wherein the error is detected after the dispensing of droplets for at least one of the arrays on the same substrate, and the source of the error is corrected prior to dispensing of droplets for other of the arrays on the same substrate or the deposition apparatus is operated so as to compensate for the error during dispensing of droplets for the same array or other of the arrays on the same substrate.

7. A method of fabricating at least one addressable array of biopolymers with multiple features on a substrate using a drop deposition apparatus having a drop dispenser unit and a sensing element, comprising:

(a) for each of multiple addresses, dispensing droplets carrying the biopolymers or biopolymer precursors from a drop dispenser unit onto the sensing element, and onto the substrate so as to fabricate the array;

(b) detecting electrical signals resulting from dispensed droplets striking the sensing element;

(c) evaluating a performance characteristic of the deposition apparatus based on the detected signals;

wherein the sensing element optionally comprises the substrate;

additionally comprising changing biopolymers or biopolymer precursors in the dispenser unit to different biopolymers or biopolymer precursors, wherein the detection and evaluation are performed after the changing and before a dispensing of any droplets for an array.

9. A method according to claim 4 wherein the dispenser unit comprises a pulse jet which ejects a droplet in response to a signal and which can de-prime, and the error is corrected by re-priming the pulse jet.

10. A method of fabricating at least one addressable array of biopolymers with multiple features on a substrate using a drop deposition apparatus having a drop dispenser unit and a sensing element, comprising:

(a) for each of multiple addresses, dispensing droplets carrying the biopolymers or biopolymer precursors from a drop dispenser unit onto the sensing element, and onto the substrate so as to fabricate the array;

(b) detecting electrical signals resulting from dispensed droplets striking the sensing element;

(c) evaluating a performance characteristic of the deposition apparatus based on the detected signals;

wherein the sensing element optionally comprises the substrate;

additionally comprising when an error is detected in which an evaluated performance characteristic is outside a predetermined tolerance, identifying one or more features on the array which are defective as a result of the error.

11. A method according to claim 10 additionally comprising communicating an identity of the identified defective features to a remote location or saving such information onto a storage medium.

13. A method of fabricating at least one addressable array of biopolymers with multiple features on a substrate using a drop deposition apparatus having a drop dispenser unit and a sensing element, comprising:

(a) for each of multiple addresses, dispensing droplets carrying the biopolymers or biopolymer precursors from a drop dispenser unit onto the sensing element, and onto the substrate so as to fabricate the array;

(b) detecting electrical signals resulting from dispensed droplets striking the sensing element;

(c) evaluating a performance characteristic of the deposition apparatus based on the detected signals

wherein the sensing element optionally comprises the substrate;

and wherein:

the dispenser unit comprises one or more pulse jets which eject a droplet in response to a signal which require priming; and

the evaluated performance characteristic is whether one or more of the pulse jets are primed prior to dispensing any droplets for an array.

14. A method according to claim 13 additionally comprising, when an error is detected in which at least one of the pulse jets is not primed, then firing the pulse jet one or more times until the detected electrical signals indicate the pulse jet is primed.

15. A method of fabricating at least one addressable array of biopolymers with multiple features on a substrate using a drop deposition apparatus having a drop dispenser unit and a sensing element, comprising:

(a) for each of multiple addresses, dispensing droplets carrying the biopolymers or biopolymer precursors from a drop dispenser unit onto the sensing element, and onto the substrate so as to fabricate the array;

(b) detecting electrical signals resulting from dispensed droplets striking the sensing element;

(c) evaluating a performance characteristic of the deposition apparatus based on the detected signals

wherein the sensing element optionally comprises the substrate;

and wherein:

the dispenser unit is repeatedly scanned across the substrate while dispensing droplets so as to fabricate the array;

the sensing element is struck by droplets so as to generate electrical signals when the dispenser unit passes beyond the array being fabricated on multiple scans during fabrication of the array.

16. A method according to claim 15 wherein the sensing element is struck by droplets so as to generate electrical signals when the dispenser unit passes beyond the array being fabricated on each of multiple scans during fabrication of the array.

17. A method of fabricating at least one addressable array of biopolymers with multiple features on a substrate using a drop deposition apparatus having a drop dispenser unit and a sensing element, comprising:

(a) for each of multiple addresses, dispensing droplets carrying the biopolymers or biopolymer precursors from a drop dispenser unit onto the sensing element, and onto the substrate so as to fabricate the array;

(b) detecting electrical signals resulting from dispensed droplets striking the sensing element;

(c) evaluating a performance characteristic of the deposition apparatus based on the detected signals;

wherein the sensing element optionally comprises the substrate;

and wherein the sensor comprises the substrate.

21. A method of fabricating at least one addressable array of biopolymers with multiple features on a substrate using a drop deposition apparatus having a drop dispenser unit and a sensing element, comprising:

(a) for each of multiple addresses, dispensing droplets carrying the biopolymers or biopolymer precursors from a drop dispenser unit onto the sensing element, and onto the substrate so as to fabricate the array;

(b) detecting electrical signals resulting from dispensed droplets striking the sensing element;

(c) evaluating a performance characteristic of the deposition apparatus based on the detected signals

wherein the sensing element optionally comprises the substrate;

and wherein the evaluated performance characteristic is the velocity of droplets dispensed from the drop dispenser unit;

the method additionally comprising dispensing multiple droplets from the dispenser unit at each of at least two different distances from the sensor, and wherein droplet velocity is evaluated based on the phase difference between the detected signal from multiple droplets at each distance.

28. An apparatus for fabricating at least one addressable array of biopolymers on a substrate, comprising:

(a) a drop dispensing unit which can deposit droplets carrying the biopolymers or biopolymer precursors onto different addresses on the substrate so as to fabricate the array;

(b) a sensing element and amplifier to detect electrical signals resulting from dispensed droplets striking the sensing element;

(c) a processor which:

causes the drop dispensing unit to dispense droplets toward the sensing element after the dispensing of some droplets onto the substrate and evaluates a performance characteristic of the dispensing unit based on the resulting detected signals; and

when an error is detected in which an evaluated performance characteristic is outside a predetermined tolerance then the processor, prior to causing the drop dispenser to dispense droplets onto that same substrate, activates an operator alert or operates the apparatus so as to correct for the error before, or compensate for the error during, dispensing of other of the droplets onto that same substrate.

29. An apparatus according to claim 28 wherein:

the processor causes the drop dispensing unit to dispense droplets toward the sensing element after dispensing of some droplets for an array; and

when the error is detected the processor activates the operator alert or operates the apparatus so as to correct for the error before, or compensate for the error during, dispensing of the other droplets for that same array.

30. An apparatus according to claim 28 wherein:

the processor causes the drop dispensing unit to dispense droplets so as to form multiple arrays on the same substrate, and to dispense droplets toward the sensing element after dispensing some of the droplets for the arrays on the same substrate;

when the error is detected the processor operates the apparatus so as to correct for the error before, or compensate for the error during, dispensing of the other droplets for other of the arrays on the same substrate.

31. An apparatus for fabricating at least one addressable array of biopolymers with multiple features on a substrate, comprising:

(a) a drop dispensing unit which can deposit droplets carrying the biopolymers or biopolymer precursors onto different addresses on the substrate so as to fabricate the array;

(b) a sensing element and amplifier to detect electrical signals resulting from dispensed droplets striking the sensing element;

(c) a processor which:

causes the drop dispensing unit to dispense droplets toward the sensing element after the dispensing of some droplets onto the substrate and evaluates a performance characteristic of the apparatus based on the resulting detected signals; and

when an error is detected in which an evaluated performance characteristic is outside a predetermined tolerance, identifies one or more features on the array which are defective as a result of the error.

32. An apparatus according to claim 31 wherein the processor additionally communicates an identity of the identified defective features to a remote location or saves such information onto a storage medium.

38. An apparatus for fabricating at least one addressable array of biopolymers on a substrate, comprising:

(a) a drop dispensing unit which can deposit droplets carrying the biopolymers or biopolymer precursors onto different addresses on the mounted substrate so as to fabricate the array;

(b) a sensing element and amplifier to detect electrical signals resulting from dispensed droplets striking the sensing element;

(c) a processor which causes the drop dispensing unit to dispense droplets toward the sensing element and which evaluates a performance characteristic of the apparatus based on the resulting detected signals, wherein the evaluated performance characteristic is the velocity or placement of droplets;

wherein the processor causes the dispenser unit to dispense multiple droplets at each of at least two different distances from the sensor, and wherein droplet velocity is evaluated based on the phase difference between the detected signal from multiple droplets at each distance.

43. A computer program product comprising a computer readable storage medium carrying computer readable program code, for use with an apparatus for fabricating an array of features which apparatus includes a drop deposition unit and a sensing element, the program code when loaded into the computer performing the steps of:

(a) for each of multiple addresses, dispensing droplets carrying the biopolymers or biopolymer precursors from a drop dispensing unit onto the substrate, so as to fabricate the array;

(b) detecting electrical signals resulting from dispensed droplets striking a sensing element during step (a);

(c) evaluating a performance characteristic of the apparatus based on the detected signals; and

(d) when an error is detected in which an evaluated performance characteristic is outside a predetermined tolerance then, prior to causing the drop dispenser to dispense droplets onto that same substrate, activating an operator alert or operating the apparatus so as to correct for the error before, or compensate for the error during, dispensing of other of the droplets onto that same substrate.

44. A computer program product comprising a computer readable storage medium carrying computer readable program code, for use with an apparatus for fabricating an array of features which apparatus includes a drop deposition unit and a sensing element, the program code when loaded into the computer performing the steps of:

(a) for each of multiple addresses, dispensing droplets carrying the biopolymers or biopolymer precursors from a drop dispensing unit onto the substrate, so as to fabricate the array;

(b) dispensing droplets toward the sensing element after the dispensing of some droplets onto the substrate;

(b) detecting electrical signals resulting from dispensed droplets striking a sensing element during step (b);

(c) evaluating a performance characteristic of the apparatus based on the detected signals; and

(d) when an error is detected in which an evaluated performance characteristic is outside a predetermined tolerance, identifying one or more features on the array which are defective as a result of the error.